

Considering this objection in more detail, the Examiner takes the position that the separate recitations in, for example, claims 1 and 7 with respect to "a tire" are unclear, arguing that it is unclear whether the tire recited in claim 7 is the same as that recited in claim 1. It is noted that the tire ("a tire") is recited inferentially in these claims and that, of course, a number of different tires would be processed in sequence by the apparatus of the invention. Thus, a different tire would be in each of the pre-heat chamber, the irradiation chamber and the discharge chamber. The reference to "a tire" in claim 7 was used because the tire in question could be any tire being processed by that chamber. However, the Examiner certainly has a point, and the recitation in claim 7 has been changed to "the tire" (emphasis added) for purposes of clarification.

Claims 1-22 have been rejected under 35 U.S.C. §103(a) as being "unpatentable over Apffel '189 or Holland '142 in view of Balbaa et al." This rejection is respectfully traversed although claim 1 has been amended so as to more clearly define over the cited references and a new independent claim 23 has been added which also patentably defines over these references.

The Examiner contends that either of the primary references "discloses an apparatus for providing destructive distillation (pyrolysis) of waste tires substantially as claimed." It is respectfully submitted that even giving the word "substantially" its broadest possible scope, this general contention is too broad and that there are a number of important distinguishing features

set forth in the claims which are not taught by the primary references.

Considering these references in more detail, the Apffel '189 patent discloses an apparatus for recovering tar, oil and fuel gas from vehicle tires, i.e., either whole tires or physically fragmented tires. The tires are dried and preheated with superheat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiberglass. In a subsequent, optional step, the char may be pyrolyzed with microwaves. In the apparatus, a steam heater is connected through a gate to a tire pyrolysis chamber.

The Holland '141 patent discloses a process for destructive distillation of organic materials such as waste tire material. This material, is indicated at 2 in Figure 1 and is supplied through a feed hopper to a belt-type conveyor 8. A hot gas stream is used reheat the waste material in a pre-heat zone 9. A microwave discharge zone 10, including a plurality of microwave sources 11a, 11b and 11c positioned above the conveyor, is located downstream of the pre-heating zone 9.

The Balbaa et al. patent discloses an apparatus for processing ceramics using a microwave oven having a resistance heating element. The Examiner relies on the teachings of the Balbaa patent with respect to the provision of a perforated wall separating the heating (microwave) chamber and the secondary (conventional) chamber to permit convectional and radiative heat

transfer from the secondary chamber to the heating chamber. The Examiner proposes to substitute "the means for permitting convectional and radiative heat transfer from one chamber to another" for the "means of preheating of Apffel or Holland."

It is respectfully submitted that the proposed substitution is not obvious. First, the Balbaa et al. patent relates to a microwave oven and it is not seen that the a routineer in the art of pyrolysis of waste tire material would look to the teachings relating to a microwave oven in an attempt to solve problems in his or her field. Further, it is not seen how, for example, teachings of the Balbaa et al. patent would be applicable to a conveyor system such as that of the Holland patent which simply uses a microwave discharge zone located along the conveyor. Similar remarks apply to the Apffel patent which discloses a complex apparatus including a steel pyrolysis chamber 407 including radiant heat tubes 409.

Moreover, as was noted above, claim 1 has been amended to even more clearly define over the references cited. More specifically, claim 1 now recites that the microwave energy supply means comprises at least first and second microwave sources positioned on opposite sides of the radiation chamber for directing microwave energy into the chamber so as to irradiate both sides of the tire received in the chamber. This feature provides a substantially more efficient transfer of microwave energy to the tire and clearly is not taught by any of the references cited. In fact, the only reference which includes a

relevant teaching in this regard is the Holland patent which discloses a conveyor with a series of overhead microwave sources as discussed above.

New claim 23 is generally based on a combination of claims 1 and 15 and provides, inter alia, that (i) the radiation chamber includes means for supporting the tire substantially vertically therein so as to define a vertical plane and that (ii) the microwave energy supply means transmits microwave energy at substantially a right angle to the vertical plane. This is, again, a highly efficient manner in which to couple the energy to the tire and, again, is simply not taught by the references. Claim 23 also distinguishes over the references for the reasons set forth above in connection with the non-obviousness of the combination proposed by the Examiner.

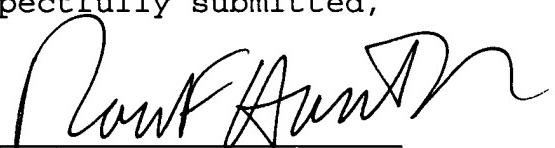
New claim 24, which depends from claim 23, recites further features of the microwave energy supply means including the provision of a microwave stirrer at the output end of at least one waveguide, and a microwave transparent window through which microwave energy is coupled to the chamber. Dependent claim 25 adds the feature discussed above, i.e., the provision of first and second microwaves on opposite sides of the radiation chamber so as to irradiate both sides of the tire.

It is respectfully submitted that the original dependent claims set forth a number of features which are not taught by, nor obvious from, the cited references. For example, claim 5 recites that the preheat chamber includes means for supplying to

the preheat chamber a purge gas under a pressure above atmospheric pressure while claim 7, which depends on claims 5 and 6, recites means for maintaining the irradiation chamber at a pressure below that in the preheat chamber so that the purge gas is transferred to the irradiation chamber when the tire is received therein. Further, claim 8 recites that the irradiation chamber comprises a tuned cavity and claims 9-11 which depend from claim 8 include further features such as cleaning means mounted on the irradiation chamber for removing contaminants from at least one microwave transparent window in that chamber. Claim 12 is separately patentable for the reasons set forth above whereas dependent claim 14 recites an array of four microwave transparent windows in each of the two opposite sides of the irradiation chamber. Others of the dependent claims set forth further patentable features.

Allowance of the application in its present form is respectfully solicited.

Respectfully submitted,

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